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Recent advances in measuring global production and global consumption

Measuring the economy in an increasingly digitalized world: Are statistics up to the task?

Prepared by Statistics Canada[1]

Summary

The digitalization of the economy is transforming the ways in which goods and services are delivered and consumed. Despite these changes there is little statistical information currently available that helps us understand the economic, social and environmental impacts of an increasingly digitalized world. While conceptual frameworks for measuring the economy are equipped to capture new digitalized transactions, the statistical infrastructure of many national statistical agencies, may need to be adapted to address the measurement challenges brought on by an increasingly 'disruptive' digital economy. It is important that national statistical organizations, such as Statistics Canada, produce meaningful statistics that will help policy makers, businesses and the public assess the impact that digitalization is having on the economy and society at large.

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I. What is the digital economy?

1. Disruptive technologies and industries, the sharing economy, the digital economy – these terms are all synonymous with the transformational changes occurring in the way businesses and individuals, produce, deliver and consume goods and services in an increasingly digitalized marketplace.

2. Enabled by technology and social trends, the digitalization of the economy is changing the way in which economic agents behave. Not long ago most people would hire a travel agent to book a vacation, go to a "brick and mortar" store to buy a new pair of shoes or rent a DVD or VHS to watch the latest movies. Today we can do this from the comfort of our home. We can search the internet and compare hundreds of hotel prices ourselves, rent someone's home for our vacation, buy products from all over the world and stream endless videos without ever leaving the house. While the final products have not drastically changed, a movie is still a movie after all, digital technologies and new business models are altering the way goods and services are delivered and consumed.

3. As more and more businesses across various industries embrace new digital technologies, the economy is becoming more and more digitalized (or digitally enabled). Online shopping and e-commerce are mainstream channels for consumption, and products themselves are moving from tangible mediums (CDs, videos, books) to digital ones. With the proliferation of digital intermediary platforms, the actors involved in a typical online transaction are also changing. While there used to be two primary actors involved in any given transaction (e.g. the buyer and the seller), increasingly online transactions include multiple actors, including but not limited to one that facilitates the transaction, the one that processes the payments between buyers and sellers and the one that distributes the final products. In addition to increasing the number of actors involved, digital intermediary platforms are also enabling private individuals, which have typically been consumers, to more easily produce goods and services themselves.

4. The term digital economy is being put forward as a way to try and capture or put a box around the new way consumers, producers and markets are interacting and exchanging goods and services. While the term has gained significant prominence, there is not yet a definition that encapsulates what is meant by the digital economy. It is unsure if such a definition will ever emerge, in part because the digital economy is pervasive – it is not so much a piece or sector or industry of the economy, rather it is transforming the entire economy. Accordingly, it is more appropriate to refer to the digitalization of the economy rather than the digital economy.

5. While the digitalization of everything is transforming both our business and personal lives there is little information currently available that helps us understand the economic, social and environmental impacts. It is rather ironic that in a digital age where information is all around us and can be obtained from the simple command such as "hey Google" or "hey Alexa" we lack basic statistics that help us understand the transformation that is occurring.

6. There is unquestionably tremendous value in data, evidenced by the emergence of new products and services driven by vast amounts of data and information and the increasing concern amongst policy makers about the impacts that digitalization and data are having on society. The ownership of these data is an important policy question. Should data be treated as a business asset and exploited for profit or is it a public good? Should this ownership be regulated and if so, under what mechanisms? Issues of privacy and sovereignty in a digital age are also important concerns. As such, it is more important than ever that national statistical organizations (NSOs) such as Statistics Canada provide insight into the impact digitalization is having on the economy and society at large.

II. Challenges in measuring an increasingly digitalized economy

7. From the statistical perspective the issues around the digitalization of the economy and society are fundamental. There has been significant international debate and discussion over the last number of years about measuring the economy in an increasingly digitalized world. The debate has centered on two questions. The first is whether the statistical frameworks used to measure the economy, such as the Balance of Payments and the International Investment Position Manual, sixth edition (BPM6)[2] and the System of National Accounts 2008 (2008 SNA)[3] adequately capture economic activities related to the digitalization of the economy. The second, less discussed question, is whether statistical agencies have the proper statistical infrastructure to capture, categorize and process the information into meaningful statistics. This paper explores both issues. First it argues that, for the most part, the goods and services are not new – they are just being delivered in new ways and therefore the conceptual and statistical frameworks are adequate and up to the task. Second, the changing nature of digital goods and services is a major challenge for statistical agencies as these products and services are increasingly difficult to measure. Statistical infrastructure must be adapted to capture changes otherwise there could be a significant deterioration in the quality and related detail of key official statistics such as gross domestic product (GDP), the Consumer Price Index (CPI) and the unemployment rate.

A. Do we have the correct conceptual frameworks?

8. The main argument put forward by individuals that argue the frameworks are no longer sufficient is that digitalization has resulted in significantly more 'free goods.' They argue that the 'utility' of these free goods – and their impact on productivity – needs to be captured in key macroeconomic indicators such as GDP in order for these measures remain relevant. For example, assume 10 years ago someone wanted to learn how to program a website. They may have purchased a book, taken a class or signed up for a seminar – all of which would have cost something and would have contributed to GDP. Today, if someone wants to learn how to code they would probably not sign up for a course and certainly would not buy a book. Instead they would visit a number of websites where information about coding and often samples of code are freely available. Where in the past this information cost something today it is free. Shouldn't this 'free stuff' somehow be monetized and included in GDP? Secondly, doesn't all this free stuff contribute to one's human capital and productivity and if not captured doesn't this impact productivity measures?

9. At first glance things today look a lot different than they did even 10 years ago – but if we look closely – the sharing of information and 'learning from a friend' has been taking place for ages. A decade ago if someone wanted to build a website, a friend who had programming skills, may have offered to share their knowledge with them and give lessons or free code to practice on – none of which would have been included in GDP. The difference today is that there are many more (anonymous) friends willing to share knowledge and the ability to find the information has increased the speed at which tasks can be accomplished. However, at the end of the day these activities were not included in GDP

[2] International Monetary Fund, 2009 (http://www.imf.org/external/pubs/ft/bop/2007/pdf/BPM6.pdf).
[3] European Commission, International Monetary Fund, Organization for Economic Co-operation and Development, United Nations, World Bank, 2009 (https://unstats.un.org/unsd/nationalaccount/sna2008.asp).

in the past and they should not be included today. It just happens that the velocity of all this activity has increased.

10. This does not mean that all this digitalization has not had an impact on GDP. In the above example there are a number of important things included in GDP today that were not included in the past (mostly because they did not exist). In order for someone to acquire the information to build a website they require access to the internet, equipment such as a computer and router, and likely software to enable the search – all of which they had to purchase or rent. In fact, obtaining the 'free code' and building a website could be quite costly.

11. Another argument from the conceptual framework point of view is that GDP does not properly capture the benefits or utility consumers receive from an increasingly digital world. This argument is best illustrated by an example and drawing on some economic theory. Let's assume that someone pays $500 for a Smartphone. However, the value of utility that they get from the phone can actually be far more than the $500 they paid for it. The phone allows them to be in constant connection with friends and family, they can find directions when lost, and get the latest news from around the word. In fact, many people may have paid $1000 for the cell phone. This additional $500 in the perceived value of the phone is referred to as consumer surplus or surplus utility.

12. Returning to the argument – many people argue that this extra utility users get from their Smartphone should be captured in GDP and that the slowdown in GDP (and productivity) is because these measures are not properly capturing surplus utility. The problem is that adding utility to GDP would turn it into something it was never intended to be. GDP is a measure of production and not utility. In fact GDP does not attempt to measure the welfare or 'consumer surplus' that individuals derive from goods and services. Rather it is a measure of the cost, expenditures spent and income earned from production. Adding a measure of utility to GDP would make it subjective and thus it would no longer be a credible measure of the evolution of the economy.

13. The third argument put forward that the conceptual frameworks need to change is that the products being produced and consumed today have changed and are not properly captured. If one looks closely, they would find that the digitalization of the economy has not fundamentally changed products. As individuals we still consume music, books, ride services, accommodations services and entertainment, however these goods and services have been digitalized. Conceptually the frameworks include digital products. However, they may need to be updated to properly articulate the production and consumption of digital products.

B. Is the statistical infrastructure equipped to capture a digitalized economy?

14. The manner in which digital products are consumed and distributed is creating significant challenges for statistical organizations around the world. As the prevalence of digital goods and services increases and new digital intermediary platforms emerge, statistical organizations must address these issues, otherwise there could be a deterioration in the quality of many key economic indicators. These challenge can be grouped into five broad categories.

15. The first relates to something referred to as global consumption – meaning that for many products such as videos, music, clothing and electronics, individuals are no longer restricted to purchasing products from local retailers but rather can purchase from anywhere in the world using online platforms. This has major implications for key economic indicators such as the CPI, international imports and exports and household expenditures.

16. Second, not only are individuals global consumers but they are also increasingly producing many goods and services themselves – referred to in the national accounts as household production. Traditionally, in most countries, household production was limited to few industries such as real estate, agriculture and household services. Today, households are now key producers in transportation services industries (e.g. private individuals that are Uber drivers), food and accommodation industries, (e.g. AirBnB) and culture and recreational industries (e.g. earning income from uploading music of videos onto social platforms such as YouTube). The increasing production from households has important measurement implications for the economy as well as the labour market.

17. Third, the digital economy has resulted in the proliferation of digital intermediary platforms, such as e-Bay, Amazon, Uber and Airbnb. These digital platforms provide intermediary and sometimes financial services, either implicitly or explicitly, that need to be classified and recorded within our national accounts.

18. Fourth, (which is both a measurement and conceptual challenge) the digital economy is causing national accountants to rethink how we measure intellectual property products as well as what constitutes intellectual property. There is little debate that most businesses today are leveraging their data to drive sales, yet the databases and the investment made to develop these databases are not being properly captured.

19. Fifth, the digital economy is changing the way people pay for goods and services – in fact it is changing the nature of money. The emergence and growth of cryptocurrencies is raising many questions about regulation and security and may lead to a significant transformation of financial industries. For the last 30 years the majority of Canada's economic indicators have been estimated using information obtained from domestic businesses, typically through surveys. These domestic businesses held the majority of the information that explained the economy.

20. With the digitalization of the economy, an increasing share of this information is held by households, by digital intermediary platforms or by businesses operating outside the economic territory of Canada. This change means that national statistical agencies such as Statistics Canada, need to update or modernize the statistical system to continue to provide their users with a comprehensive, credible and consistent set of economic data. This will allow policy makers, businesses and individuals to better understand the social and economic implications of an increasingly digitalized world.

C. Producing meaningful statistics on the digital economy

21. For its part, Statistics Canada has started to adapt how it produces meaningful statistics that will help policy makers, businesses and academics assess the impacts of an increasingly digitalized economy. However, the agency needs to increase the speed at which it responds and its flexibility to adjust in order to address the measurement challenges brought on by an increasingly 'disruptive' digital economy. Key areas of investment currently underway include:

- 'Surveying' digital platforms – Household production is increasing but statistical agencies cannot afford to survey individuals directly to estimate all of these productive activities. Instead statistical agencies need to work with the digital intermediary platforms to obtain aggregate information related to the productive activities of households in their jurisdictions.
- New products such as digital intermediation services need to be added to classification systems and properly recorded. An added complexity is the strong possibility that these transactions often include an international component. These transactions need to be unbundled and decomposed into their separate flows.

Statistics Canada is evaluating and updating its classification systems to account for these new types of transactions.

- The fact that households are now direct importers and exporters needs to be properly record in the economic accounts. Imports of goods and services directly by households are growing yet there are no statistical instruments that capture this growing activity. Statistics Canada is investigating the use of alternative sources of information to produce aggregate estimates of household imports, exports and the income households generate from the production of digital cultural products such as music and videos distributed on digital social platforms.
- The agency has established a research function that stays abreast of new digital developments and undertakes the tedious process of identifying if and how the new type of activity is recorded in the economic statistics program.
- The agency is also capitalizing on the new technology itself to enrich its data holdings. For example, using techniques such as web-scraping and application programming interface to replace data collection from traditional means.
- Finally, the agency is looking at how it measures data itself, and trying to determine the value of data as an asset in the production of goods and services and determining if estimates of national wealth need to include an estimate of the nation's data holdings.

22. At this point - it is safe to say that the box we put around what we call 'the economy' is still the right size. The problem and challenge is more measuring what is going on inside the box and ensuring we have the right tools to assemble the pieces that provides all Canadians with a comprehensive, consistent and informative monthly, quarterly and annual picture of the economy. Exciting times indeed!

Annex [English only]

About the Authors

23. André Loranger is currently the Assistant Chief Statistician responsible for the Economic Statistics Program at Statistics Canada. In that role, he is ultimately responsible for ensuring the quality, relevance, and accessibility of Statistics Canada's suite of economic statistics including industrial production, international trade, investment, consumer and producer prices, the environment and the macroeconomic statistics produced within the Canadian System of National Accounts (GDP, Balance of Payments). André, an economist with an M.A. (Economics) degree from the University of Ottawa, began his career in the public service at Statistics Canada in 1997 where he spent most of his career compiling estimates of GDP. Prior to his current position, André was the Director of Producer Prices Division, and the Director General of the Macroeconomic Statistics Branch.

24. Amanda Sinclair is a senior analyst for the National Economic Accounts Division at Statistics Canada. Her main areas of study include capturing digital transactions in gross domestic product, the sharing economy and peer-to-peer transactions, the underground economy, as well as culture and sport in the Canadian economy. Her previous work includes analysis of consumer prices and inflation in Canada.

25. James Tebrake is a graduate from McMaster University (Honours BA in economics) and Carleton University (Master's degree in economics). He joined Statistics Canada in 1992. Since that time he has worked in a number of program areas in the Economic Statistics Field including the international trade statistics program and the industry statistics program. He is currently Director General of the Macroeconomic Accounts Branch where he oversees programs responsible for developing macroeconomic indicators such as gross domestic product, national net worth, labour productivity, balance of payments and government revenues, expenditures and levels of debt.

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